

**Patent Claims**

1. Flame-hydrolytically produced titanium dioxide powder present in aggregates of primary particles, characterised in that

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- it has a BET surface of 20 to 200 m<sup>2</sup>/g and
- the half width HW, in nanometers, of the primary particle distribution has values between

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$$\text{HW [nm]} = a \times \text{BET}^f \text{ where } a = 670 \times 10^{-9} \text{ m}^3/\text{g} \text{ and } -1.3 \leq f \leq -1.0 \text{ and}$$

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- the proportion of particles with a diameter of more than 45  $\mu\text{m}$  is in a range from 0.0001 to 0.05 wt. %.

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2. Flame-hydrolytically produced titanium dioxide powder according to claim 1, characterised in that the BET surface is in a range from 40 to 60 m<sup>2</sup>/g.

3. Flame-hydrolytically produced titanium dioxide powder according to claim 2, characterised in that the 90% spread of the number distribution of the primary particle diameters lies in a range from 5 to 100 nm.

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4. Flame-hydrolytically produced titanium dioxide powder according to claim 2 or 3, characterised in that the equivalent circular diameter of the aggregates (ECD) is less than 80 nm.

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5. Flame-hydrolytically produced titanium dioxide powder according to claims 2 to 4, characterised in that the mean aggregate area is less than 6500 nm<sup>2</sup>.

6. Flame-hydrolytically produced titanium dioxide powder according to claims 2 to 5, characterised in that the mean aggregate circumference is less than 450 nm.
- 5 7. Flame-hydrolytically produced titanium dioxide powder according to claim 1, characterised in that the BET surface lies in a range from 80 to 120 m<sup>2</sup>/g.
8. Flame-hydrolytically produced titanium dioxide powder according to claim 7, characterised in that the 90% spread of the number distribution of the primary  
10 particles diameters has values from 4 to 25 nm.
9. Flame-hydrolytically produced titanium dioxide powder according to claim 7 or 8, characterised in that the equivalent circular diameter of the aggregates (ECD) is less than 70 nm.
- 15 10. Flame-hydrolytically produced titanium dioxide powder according to claims 7 to 9, characterised in that the mean aggregate area is less than 6000 nm<sup>2</sup>.
11. Flame-hydrolytically produced titanium dioxide powder according to claims 7 to 10, characterised in that the  
20 mean aggregate circumference is less than 400 nm.
12. Flame-hydrolytically produced titanium dioxide powder according to claims 1 to 11, characterised in that the proportion of aggregates and/or agglomerates with a diameter of more than 45 µm lies in a range from 0.001  
25 to 0.01 wt.%.
13. Flame-hydrolytically produced titanium dioxide powder according to claims 1 to 12, characterised in that for a given BET surface it has an anatase/rutile ratio of 2:98 to 98:2.

14. Flame-hydrolytically produced titanium dioxide powder according to claims 1 to 13, characterised in that it has a chloride content of less than 0.1 wt.%.  
15. Flame-hydrolytically produced titanium dioxide powder according to claims 1 to 14, characterised in that the compacted bulk density has values of 20 to 200 g/l.  
16. Process for the production of the flame-hydrolytically produced titanium dioxide powder according to claims 1 to 15, characterised in that
- a titanium halide, preferably titanium tetrachloride, is vapourised at temperatures of less than 200°C, the vapours are transferred to a mixing chamber by means of a carrier gas with a proportion of steam in a range from 1 to 25 g/m<sup>3</sup>, and
  - separately from this, hydrogen, primary air, which may optionally be enriched with oxygen and/or pre-heated, and steam are transferred to the mixing chamber,
  - wherein the proportion of steam is in a range from 1 to 25 g/m<sup>3</sup> primary air,
  - the lambda value lies in the range from 1 to 9 and the gamma value lies in the range from 1 to 9,

following which

- the mixture consisting of the titanium halide vapour, hydrogen, air and steam is ignited in a burner and the flame burns back into a reaction chamber sealed from the ambient air, wherein

- a vacuum of 1 to 200 mbar exists in the reaction chamber,
  - the exit velocity of the reaction mixture from the mixing chamber to the reaction space lies in a range from 10 to 80 m/sec,
  - in addition secondary air is introduced into the reaction chamber, wherein
    - the ratio of primary air to secondary air is between 10 and 0.5,
    - following which the solid is separated from the gaseous substances, and
    - the solid is then treated with steam.
17. Process according to claim 16, characterised in that the steam is introduced together with the air into the mixing chamber.
18. Use of the flame-hydrolytically produced titanium dioxide powder according to claims 1 to 15 for the heat protection stabilisation of silicones.
19. Use of the flame-hydrolytically produced titanium dioxide powder according to claims 1 to 15 in sunscreen agents.
20. Use of the flame-hydrolytically produced titanium dioxide powder according to claims 1 to 15 as a catalyst, as a catalyst carrier, as a photocatalyst, and as an abrasive for the production of dispersions.